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ABSTRACT

The purpose of this interim report is to evaluate the potential and limitations of satellite television for education and training within the European context through an examination of the experiences of countries other than the United Kingdom. Further information is awaited; however, projects are identified for Australia, Canada, China, Western Europe, Indonesia, Peru, the South Pacific, the United States, and the West Indies, as well as a cooperative project involving a number of countries, i.e., Project SHARE. The main communications configurations used by these projects are described, target groups and audiences are identified, the types of courses offered are considered, and management and organization issues are discussed. Preliminary findings from the literature search, project examination, and personnel communications are reported, and reasons for the lack of a European educational satellite service are suggested. (EW)

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USE OF SATELLITES FOR EDUCATION AND TRAINING: A REVIEW

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Purpose

The aim is to evaluate the potential and limitations of satellite TV for education and training within the European context, through an examination of experience in other countries.

Method

1. Literature search

2. Personal communication with key personnel on most projects surveyed

3. Commissioned studies of:

   INSAT (India)
   PALAPA Higher Education Project (Indonesia)
   University of South Pacific (Fiji)

4. Personal experience of Knowledge Network (Canada)

This is an interim report, as further information, particularly on projects in the USA, is still awaited or being collated.

Projects Identified

Australia

ATS-1 (1983):	Tertiary Distance Education Network	
AUSSAT satellite (1985)	Victoria:	Deakin-Gordon
	Queensland:	Mt.Isa School of the Air
		Q-Net
		The Club
		Darling Downs
		Brisbane CAE
		James Cook University
		TAFE
	Federally	National Working Party on Telecommunications in Tertiary Education
		EMSAT

(Note: all except Mt.Isa - which became operational in 1986 - are proposals at this stage)

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Canada

Symphonie (1976)	Quebec/France	COPUSE/GUISE
Hermes (1976)	Quebec	University of Quebec
	Ontario/ Newfoundland	University of Western Ontario/ Memorial University
	Ontario	Carleton University/Stanford University
		Ottawa/Memorial University
		TVOntario (Camp)
	British Columbia	STEP (BCIT+)
Anik-B (1978)	Ontario	TVOntario (Spring Academy, NOHDBOT, NODE)
	British Columbia	Knowledge Network
	Alberta	ACCESS
	Quebec	La Grande Causerie/Kativik
	Newfoundland	Memorial University (telehealth)
Anik-C (1983)	Ontario	TVOntario (regular programming)
	British Columbia	Knowledge Network (regular programming)
	Alberta	ACCESS (regular programming)
	Atlantic provinces	Atlantic Satellite Network
	Saskatchewan	Uplink 84, STELLA, Uplink 86

China

Not yet operational	Chinese Central Television University

(see also Project Share)

Europe (West)

Olympus (1988)	Various proposals

Indonesia

PALAPA (1984)	Indonesian Distance Education Satellite System (INDESS)
	Universitas Terbuka (Indonesian Open University)

Project SHARE

Intelsat (1985)	USA/Kenya/ Tanzania	Women's health issues
	USA/Kenya/Ghana Tanzania/Nigeria/ Ethiopia	Microbiology (university-level)
	China	University lectures
	Canada/Uganda/ Kenya	Radiology
	Canada/West Indies	Pediatrics
	Eire/Jordan	Water Resource Management
	US/Peru+	Video-conferencing
	USA/Columbia/ Venezuela/Costa Rica/Peru/Chile/ Dominican Rep.	Pediatrics

South Pacific	University of South Pacific
West Indies	University of West Indies (health/medicine)

Other projects are in the planning stage.

Peru

Intelsat V (1983)	Peru Rural Communication Services Project

South Pacific

ATS-1 (1972)/ Intelsat IV or V(1986?)	University of South Pacific

United States of America

(survey still being completed)

ATS-6 (1974)	Alaska	Telemedicine in Alaska
ATS-6 and ATS-3 (1974)	Appalachians	Appalachian Educational Satellite Project
Aurora 1 (?)/Anik-C	Alaska	Learn Alaska
G-STAR1 (1985)	Federally	National Technological University
? (1985)	International	Texas Instruments (artificial intelligence)
? (1986)	Federally	IBM Corporate Technical Institutes

West Indies

ATS-6 and ATS-3 (1978)	University of West Indies: Project Satellite
Intelsat (1983)	University of West Indies Distance Teaching Experiment (UWIDITE)

Main communications configurations

One-way, video receive only

Foreign language teaching: general satellite broadcasts in foreign languages have been taken down from satellite transmissions, and used by teachers as authentic language material for foreign language teaching (e.g. at Brighton Polytechnic, UK). This is an interesting example, because no special provision of educational programming via the satellite is necessary for this use.

An educational television service: Knowledge Network and TVOntario, in Canada, and INSAT in India, use a satellite system for the distribution of a complete educational television service, covering a wide range of subject areas. Such a service differs only in the scale and reach of the distribution from a normal terrestrial educational television service, and hence all the advantages and disadvantages of educational broadcasting apply just as much to this use (see Bates, 1984 for a full review of this; an appendix is attached giving appropriate functions for broadcast television).

One-way video, two-way audio

Quite a large number of projects have combined video transmission out by satellite with terrestrial communication by telephone (e.g. North Island College, via Knowledge Network), in this way reaching home-based students, or even with return audio communication via satellite (e.g. part of

the Telemedicine in Alaska project) using point-to-multi-point transmission, the multi-point centres being in institutions. Very often, the outward video in these configurations tends to be a live classroom lecture, perhaps supported by low-band graphics (out only), such as slow-scan or still-frame picures, or digitised graphics, as in some of the National Technological University offerings, 35% of whose lectures are live and interactive. University College, Dublin, has used Intelsat services through Project Share to relay a set of 16 live lectures on water management to Amman in Jordan, using audio-back for questions. Such lecture-based projects seem to be popular, particularly for company training (IBM) or for "quick and dirty" up-dating of professional engineers or medical staff.

Two-way audio

This allows delivery of lectures from a number of different sites, and questions and discusion back from students at various centres. This is the basic system for the University of the South Pacific.

Two-way, low-band graphics and audio

In this configuration, unique to the Indonesian INDESS project, all centres can communicate with each other through a combined audio-graphics signal. This system is used for lectures or administrative purposes, with lectures originating from a number of sites.

Two-way video

This allows two or more sites to have full video (and audio) communication with each other. Three main functions have emerged: lectures originating from several different sites, but available anywhere on the network, with either audio or full video interaction from remote sites (Telemedicine in Alaska); exchange of research or teaching materials between different institutions (Project SHARE); or administrative meetings/video-conferencing (Project SHARE).

The systems like Knowledge Network, TVOntarion and INSAT which provide a regular (one-way) educational television service tend to use more "traditional" modes of educational broadcast programming, covering a wide range of subject matter, and producing relatively high quality materials, in the sense of exploiting the unique presentational characteristics of television. However, these services are generally not interactive, in the sense of having two-way communication, although Knowledge Network does provide some interactive programming.

Systems which place heavy emphasis on two-way communication tend to rely heavily on traditional lecture formats, whether the lecture is delivered by television or audio. Few systems (Knowledge Network is the main one) have combined high quality television programming with interaction.

Target groups and audiences

Apart from the general educational television services like Knowledge Network, TVOntario and INSAT, which provide for a wide range of target groups, the main target groups for satellite projects have been students in higher or professional education, particularly in engineering and medicine.

It is not easy to measure those who are totally dependent on satellites for transmission, since many projects depend on re-broadcasting, either via ground transmitters or cable. The largest audiences, not surprisingly, are those receiving general educational services via satellite. Possibly the largest audiences to date are found watching the INSAT programmes (about 600,000 children watching any single programme, although this number is expected to double in the next few years.) TVOntario has a weekly audience of 2.2 million (out of 8.7 million), but much of its area is covered by terrestrial transmission or cable. Knowledge Network reaches about 436,000 people in any week, but the total number enrolled in courses is about 16,000. INDESS (Indonesia) has been used by about 3,500 students. NTU (USA) has a total of 1,200 students over 330 courses. For the remaining projects, numbers involved are usually less than 100, and even for the general programming services, individual audiences for particular programmes may be less than 100.

Types of courses offered

1. General educational programming (enrichment): these are relatively expensive productions, glossy programmes likely to be of wide general appeal, not linked to any specific course or qualification. They may stand alone, or come with print support material or associated "coffee table" books. They may be single programmes (e.g."The Ascent of Man") or part of a series. Examples are Knowledge Network's "Teleseries", TVOntario, and INSAT's University programmes.

2. Schools broadcasts: again these are primarily intended as enrichment to support the teacher in the classroom. Usually they are accompanied by notes. The main project is INSAT, but there are also plans for this type of programming in Australia. It is worth noting that no project uses satellite for the direct teaching of school children, no doubt having learned from the experience of using terrestrial-based television in this way in El Salvador and American Samoa.

3. Integrated multi-media courses, of which satellite programming is a part. The University of the South Pacific integrates its satellite tutorials with the correspondence material used by the students. University of the West Indies also provides support materials and other media. In general, though, most satellite projects to date have relied heavily on the satellite system as the main means of teaching - an interesting contrast with distance education systems using terrestrial broadcasting, where it normally plays merely a support role.

4. Distributed lectures: apart from the general educational services, this has been the main use to date. This is the method used by many of the North American projects (e.g. Learn Alaska, National Technological University, Knowledge Network's Telecourses, IBM's company training, and a number of ther Project SHARE projects). These courses may either lead to credit, or be one-off, temporary projects.

Total transmission time

TVOntario and Knowledge Network provide a full television channel, operating from 9.00 in the morning until 11.00 in the evening. INDESS (Indonesia) operates about 7 hours a day. INSAT on the other hand has under three hours a day of educational programming. Other projects either had a short life, or use satellite transmission for very short periods (less than an hour a day), or both.

Management, organisation and finance

Project management and the organisation of suppurt services in most of the satellite projects were complex. Most systems needed to set up a complex set of committees and infrastructures to ensure educational input to the programming, and strong links with ground services. At the same time, most projects needed a team of professionals to actually run the service. Management and administrative costs tend to be significant, particularly if the time of people with other jobs who contribute to the establishment and running of an educational satellite project is taken into account. Management and organisational structures were very idiosyncratic to each project, determined by the politics and existing services and organisations served by the satellite project. Nevertheless, it is possible to pull out some important issues, particularly in the context of a possible European educational satellite service.

A number of economic models have been tried, both for general satellite services and for education.

Evaluation findings

There were surprisingly few summative evaluation studies, specific to the use of satellites for

education. Both TVOntario and INSAT carried out research and evaluation as an integral part of their work. Most other evaluations though tended to concentrate on the technology, rather than on the services that ran on the technology. The evaluation findings naturally varied a great deal from project to project, but certain general trends could be discerned:

1. In general, the up-link and the satellite itself are rarely problematic, although there have been one or two disasters. In general, satellites have remained operational longer than expected.

2. Satellite reception equipment is getting cheaper and more reliable. In developed countries, satellite reception is not a major difficulty, once installed. In developing countries though it can be a major problem, not so much due to the reception equipment itself, but due to fluctuations in power supply, and inadequate maintenance of sets.

3. Satellite transmission can increase access, but few projects actually reached very large numbers, although they have allowed educational provision and communication to extend over far greater distances than previously..

4. Satellites are only as good as the educational services that run on them. Using satellites as just another means of relaying educational broadcasts carries all the advantages and disadvantages already known to exist with regard to terrestrial broadcast services.

5. Providing high quality programming, especially original programming, that fully exploits the unique presentational characteristics of television, is expensive.

6. Interactive programming is low-cost, and provides a new service, but often fails to exploit the unique presentational characteristics of television

7. Providing a regular service, rather than just demonstration projects, requires new infrastructures for programme planning, production, supply and maintenance of equipment, and ground support services for tuition and counselling.

8. Projects take time to set up properly; as much time and resources have to be given to production of material and the provision of ground tuition services as to hardware issues.

9. The recurrent costs in running an educational satellite service soon outstrip the capital costs of setting up the system.

Why has there been no European educational satellite service?

1. While most satellite services have been set up on a continental basis, they have covered one nation or one common language, or reached particularly remote areas of a country that otherwise was not being served.

2. The education service throughout Europe is almost universally unaware of the availability of satellite services in Europe.

3. The prior concern of European satellite operators has been to carry revenue generating services, and consequently they have directed their marketing solely at the business sector.

4. There has been up to now no recognition or definition of educational needs in Europe which might be met through satellite services.

5. In most, but by no means all, existing European satellite services, costs for education would be prohibitive.

6. Both the satellite operators and the potential educational users are fragmented groups. Operators in particular would prefer to negotiate with one 'block' client than with a host of small clients; similarly, educators would not know which operators to go to, or what services they could offer.

Certainly, there is a need for demonstration projects in Europe using satellite communications. With regard to organisation and management, though, the mounting of such show-case projects would be considerably eased if there was one organisation able to provide technical advice and negotiate times, tariffs, and facilities on behalf of the European educational community.

If a DBS satellite channel is available to European educational users, it might be used for a number of purposes.

a. Distributed training (one transmission point, multiple reception points), with return audio via normal telecommunications facilities. Over time, return facility will increase in range (voice, data, graphics, compressed video, full video) as communications facilities (ISDN, broad-band cable services) improve. This could be on either a national or international basis.

b. Extension of existing television services to new target audiences/countries. While the British Open University would be concerned at the use of satellite for distribution to its UK students, when it already has comprehensive coverage by terrestrial distribution, it would be interested in extending its courses to other European countries through a DBS satellite signal (provided the necessary ground-support can be provided).

c. Provision of 'teleseries' and data services with particular pan-European content (Art, language teaching, agricultural information, stock prices, etc.), using specially created programme material, which local colleges can build courses round.

These are just a few examples. With proper dissemination of information, and communication within and between educational and training providers and satellite operators, it should be possible to build up an extensive educational provision on both DBS and low-powered satellite in Europe over the next 10 years. This will not happen without some form of intervention though from either governments or inter-governmental organisations like the EEC.